

## Appendix F: USGS Sediment Quality Survey<sup>1</sup>

The U.S. Geological Survey, in cooperation with the MA DEP, MA DCR, and Tufts University, conducted a study of bottom-sediment quality in selected lakes, rivers and estuaries in the Mystic River Watershed, during the years 2001 to 2003. More than 100 bottom-sediment grab samples and 8 bottom-sediment cores were analyzed for the presence of pesticides, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and trace elements. The sampling covered Lower Mystic Lake, Mystic River, Alewife Brook, Malden River, Island End River, Chelsea and Mill Creeks, and the Boston Inner Harbor.

Samples were found to have high levels of toxic elements, particularly arsenic, chromium, copper, lead, silver, zinc, and PAHs, when compared with background and with sediment from other urban rivers. Dredging to support port activity has evidently removed some contamination in the lower watershed, but some chemicals are still present in concentrations that pose a threat to benthic organisms and that may cause health risks if humans come in contact with the sediment. More work is needed to assess the results of this study and establish priorities for sediment remediation, based on levels of contamination and potential for human exposure. In addition, more investigation of the core sampling results is needed to assess the extent to which there is on-going contamination in specific locations, and to identify the sources of any such continuing contamination.

Table F-1 provides a brief summary of the grab sample results by sampling location. USGS calculated the overall toxicity of the sample contaminants for each location by comparing the constituents with “possible effect levels” (PELs) for benthic organisms. This analysis was done for the top 2-4 inches of the bottom sediment, and the results were expressed as the potential toxicity compared to a set of reference toxicity tests. For example, an estimated potential toxicity of 20 percent indicates that 20 out of 100 toxicity tests are likely to show some level of toxicity for the concentration of contaminants measured in a specific sediment sample. The average predicted potential toxicity ranged from 13 to 97 percent.

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<sup>1</sup> Robert F. Breault, John L. Durant, and Albert Robbat, Jr. *Sediment Quality of Lakes, Rivers, and Estuaries in the Mystic River Basin, Eastern Massachusetts, 2001-03*. U.S. Geological Survey, Scientific Investigations Report 2005-5191, 2005.

**Table F-1: Estimated Sediment Toxicity with Reference to Consensus-Based Freshwater Sediment-Quality**

<b>Waterbody</b>	<b>Number of Samples by Estimated Average Percent Toxicity to Benthic Organisms</b>			
	<b>0-15%</b>	<b>&gt;15-45%</b>	<b>&gt;45-60%</b>	<b>&gt;60-80%</b>
Lower Mystic Lake	1	0	3	3
Alewife Brook	0	1	3	1
Mystic River – freshwater	6	6	20	1
Mystic River – salt water	1	13	2	0
Malden River	0	2	4	5
Island End River	0	0	4	1
Chelsea/Mill Creek	4	15	3	0
Boston Inner Harbor	0	4	0	0

Source: Derived from Figure 17, Breault et al (2005).